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ART. VII.—*Victorian Tertiary Catenicellidae (Bryozoa)*, Part I.

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(With Plate VIII.)

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### Introduction.

A cursory inspection of the *Catenicellidae* appeared to show that in this group would be found a number of index fossils of value to Victorian Tertiary stratigraphy. A detailed examination has scarcely realized this, and has narrowed down the useful index forms to eight in the Oligocene and fifteen in the Miocene. Despite close search, no representative of this group has been found in the Lower Pliocene, the shallow water of this period having been apparently uncongenial.

Apart from the demands of stratigraphy, the examination of individuals of the group has revealed many points of morphological interest. From a study of recent species of the group, it was found that the morphology of the zoecia of a species even on the same zoarium varied considerably within certain limits. Since this also applies to the fossil species, it was found that previous descriptions were inadequate to define the species fully, and, as few variations have been recorded, it has been necessary to provide a more detailed description of the variations as far as observed, making plesiotypes where necessary.

### Classification.

The heterogeneous group of the genus *Catenicella* as designated by Busk(1) no longer stands. The name *Catenicella* is now merely used for species which have not been sufficiently studied, to place them in the genera proposed by Macgillivray and later authors, or as a generic name for those species whose position is uncertain(3). Though Busk(2) divided the genus *Catenicella* into vittate, fenestrate, and simple groups, it was left to Macgillivray(5) to make a genus of the vittate group under the name of *Caloporella*, which, being preoccupied, was changed to *Vittaticella* by Maplestone(7). Macgillivray(5) also founded the genera *Claviporella*, *Ditaxipora*, *Strophipora*, *Stenostomaria*, and *Microstomaria*. Later, Maplestone(6) introduced the genera *Strongylopora*, *Digenopora*, and *Costaticella*, the old name of *Catenicella* being retained for the true fenestrate group. Levinsen(4) first recognized that the fenestrate group could be separated into two distinct genera, *Scuticella* and *Pterocella*, distinguished by different zoecial structures, while Canu and Bassler(3) further separated them by their different types of ovicells.

The latter have arranged the genera of the Catenicellidae in a series, keeping the genera with similar types of ovicells together, and it is now proposed to group the genera with similar types of ovicells into sub-families. The salient features in the subdivision of the Catenicellidae may be summarized briefly as follows:—

- (i) A sub-family is determined by the position of the ovicell.
- (ii) A genus is fixed by the nature of the frontal structures and lateral chambers.
- (iii) A species is determined by the differences in size, shape, and position of the frontal structures and the lateral chambers, and any other discriminating character of sufficient importance.

Ninety species of the Victorian Tertiary Catenicellidae have been described up to the present time. Waters(9) has described seven species and one variety, as well as recording six living species. Macgillivray(5) in 1895 described 27 additional species, while, since then, Maplestone(8) has brought the total to the present number.

The following descriptions have been made on the subdivisions proposed:—

### **Systematic Description.**

Class BRYOZOA.

Sub-Class ECTOPROCTA.

Super-Order GYMNOLAEMATA.

Order CHEILOSTOMATA.

Sub-Order ASCOPHORA.

Family CATENICELLIDÆ.

Description.—Zoarium phytoid, erect, radicelled, ramified and articulated, each internode consisting of one zoecium or two (geminate pair), rarely three (triglobulus), united laterally. Zooecia generally shield- or vase-shaped with frontals facing in the same direction. Both margins of internodes more or less expanded into three compartments, the scapular chamber approximating to level of aperture, and generally lodging an avicularium, the suprascapular chamber occupying the area above the scapular chamber, and the infrascapular compartments occupying more or less of the area below the scapular, all of them being more or less calcified. Aperture, with or without hinge-teeth or median sinus, approximates to plane of frontal. Sternal area porous, garnished with fenestrae or bordered with vittae. Ovicells may be between and coherent to two zooecia in a straight line, pertaining to a terminal daughter zoecium of a geminate pair, pertaining to the mother zoecium of a triglobulus, or may be terminal and separate.

## Sub-Family VITTATICELLINAE, sub-fam. nov.

Description.—Internodes of one zoecium or a geminate pair, the latter sometimes giving rise to three zooecia, the extra one arising from point of fusion of two zooecia forming a geminate pair. Avicularia of moderate size, and usually well-developed, but absent from adzooecial side of mother zoecium. Suprascapular and infrascapular chambers usually small or aborted, and the latter even absent. Vittae of larger or smaller size situated in various positions longitudinally below level of aperture, from entirely laterally to quite on to sternal area, and possessing varying numbers of rows of pores. Aperture roughly circular, having a slightly concave proximal rim, with often a semi-circular elevation beneath it. Ovicells placed between and coherent to two zooecia in a straight line.

Note.—Since the genera of the Vittaticellinae have the ovicells as their only constant distinction, and as these occur very rarely as fossils, it seems advisable to refer provisionally all vittate species to the genus *Vittaticella*, since it contains the vast majority of recent species, unless definite proof of their belonging elsewhere is found.

Genus **Vittaticella** Maplestone, 1901.

1895. *Caloporella* Macgillivray. *Trans. Roy. Soc. Vic.*, iv., p. 18.  
1901. *Vittaticella* Maplestone. *Proc. Roy. Soc. Vic.* (n.s.), xiii. (2), p. 201.  
1909. *Catenaria* Levinsen. *Morph. Syst. Stud. Cheil. Bryo.*, pp. 221, 253.  
1929. *Vittaticella* Canu and Bassler. *United States Nat. Mus. Bull.* 100, vol. ix., p. 438, text-fig. 174.

Description.—The imperforate ovicell, generally with beaded margin, is partly embedded in distal zoecium or two single zooecia in a straight line. Aperture, with slightly protruding concave proximal rim, generally supplied with a pair of moderately well-developed hinge-teeth. Vittae vary in position on margins of zooecia.

Note.—Levinsen has proposed the name *Catenaria* Savigny as the generic name for *Vittaticella*, but Savigny has only given the qualificative term "Cénaïres" to the species figured on plates 1 and 2, in the form of a French plural substantive, which Levinsen says corresponds with the Latin generic name *Catenaria*; but since Savigny never stated this, nor gave a description of this so-called genus, this generic name may be disregarded. It is also significant that no specific names were given to the species figured until Audouin did so. *Caloporella* being preoccupied, the genus *Vittaticella* Maplestone, now stands.

## VITTATICELLA ENORMIS (Maplestone, 1898).

1898. *Caloporella enormis* Maplestone. *Proc. Roy. Soc. Vic.* (n.s.), xi. (1), p. 18, pl. ii., fig. 11.

Description.—Zooecium moderate to very large, roughly rectangular, tapering slightly proximally; length about twice greatest width, which occurs centrally.

Aperture nearly circular, distal margin not raised, proximal rim concave and protruding, forming a crescentic elevation above level of frontal, in centre third of zooecium at four-fifths of the distance distally from base. Height of aperture is half distance from proximal rim to summit.

Scapular chambers at level of upper half of aperture, and about two-thirds its height. Suprascapular compartment smaller than scapular chamber, extending to aperture of distal connecting tube. Infrascapular chambers extend to summits of vittae.

Vittae wholly frontal, extending from slightly above level of proximal rim almost to base and, from a little within lateral margins, inwards about one-third width of zooecium, leaving a slightly convex smooth raised band about width of aperture tapering slightly from proximal rim to base; shallow, with four vertical rows of pores; on daughter zooecium of geminate pair vittae are pyriform and proximally broader.

Dorsal side convex, with narrow flange representing dorsal view of lateral chambers, extending less than half-way from summit of zooecium. Angle between axes of daughter and mother zooecia about  $30^{\circ}$ . Ovicell unknown.

Dimensions.—Holotype: Zooecium; length 1.07 mm., width 0.47; vittae, length 0.78, width 0.17; aperture, diameter 0.13.

Typical specimen from 650 feet, Glencoe No. 7 bore: Zooecium; length 0.8 mm., width 0.35; vittae, length 0.6, width 0.12; aperture, diameter 0.13.

Localities.—Balcombe's Bay (Balcombian, Oligocene); Glencoe No. 7 bore, 1,270 feet (Oligocene); Clifton Bank, Muddy Creek; Campbell's Point; very prolific at 650 feet in Glencoe No. 7 bore, less common to 985 feet (lower Miocene); Knight's bore, Dartmoor.

Observations.—Remarkable for exceptionally large and extensive vittae and great size of zooecia, particularly in type specimen, those from the Lower Miocene of Glencoe No. 7 bore being comparatively smaller in size. It varies mainly in size, specimens only 0.66 mm. in length having been found, and also in extent of vittae, but the restricted scapular chamber and the four vertical rows of pores in the vittae are constant, and should serve to distinguish the species readily.

## VITTATICELLA GRANDIS (Maplestone, 1898).

1898. *Caloporella grandis* Maplestone. *Proc. Roy. Soc. Vic.* (n.s.).  
xi. (1), p. 16, pl. 1, fig. 7.

1898. *Caloporella cordata* Maplestone. *Ibid.*, p. 17, pl. 1, fig. 9.

Description.—Zooecium regularly triangular, distal end being broader. From summit of suprascapular chambers, margins slope regularly to base. Length one and a half times greatest width occurring across tips of suprascapular chambers, the most distal points in zooecium.

Proximal rim situated two-sevenths of distance proximally from distal connecting tube aperture to base, and is one-quarter width of zooecium at that level; in shape slightly concave, with a semi-elliptical elevation beneath it. Aperture roughly circular, extending half distance from proximal rim to summit, distal rim protruding above level of frontal.

From distal connecting tube aperture, a linear groove extends to distal rim, following it for a short distance, then branching obliquely to summit of each vitta and beyond to margin of zooecium, marking off lateral chambers from zooecium proper. Scapular chambers at level of upper half of aperture, and extending slightly above it. Infrascapular chambers bounded by base of scapulars and linear grooves. Calcified suprascapular chambers extend as triangular expansions above level of distal connecting tube aperture.

Vittae situated towards each margin of frontal, facing almost forward and extending from slightly below proximal rim almost to base of zooecium, and laterally almost one-quarter the distance across zooecium at its middle level. Vittae moderately depressed with two rows of pitted pores, seven to ten in each row.

Dorsal side strongly convex, with lateral chambers forming a triangular flange extending along margin of upper half of zooecium. In geminate pairs, vittae of daughter zooecium shorter, and contain fewer pores. Axis of daughter zooecium makes angle of  $40^\circ$  with that of mother zooecium.

Ovicell an extension of proximal zooecium partly embedded in distal zooecium in form of a cordate elevated area bordered by a raised band commencing on each side at level of distal rim of aperture of proximal zooecium, and extending outwards past margins of zooecia, then inwards and slightly downwards to meet just below aperture of distal zooecium. Extensions beyond margins of zooecia on each side depressed.

Dimensions.—Zooecium, length 0.6 mm., width 0.47; vittae, length 0.325, width 0.05; aperture, diameter 0.11.

Localities.—Clifton Bank; Campbell's Point.

Observations.—Macgillivray has figured two specimens of *V. insignis*.



The specimen represented by Fig. 13 on Plate 2(5), has almost linear vittae at margins of zooecium facing directly forward and having a single row of pores, while Fig. 14 has the vittae inclined at a slight angle to frontal with two rows of pores, agreeing with Maplestone's type of *V. grandis*. It is proposed to make Fig. 13 the holotype of *V. insignis*, and Fig. 14 a plesiotype of *V. grandis*. Specimens labelled *V. insignis* in the Macgillivray collection from Mornington are all referable to either *V. speciosa* or *V. enormis*, none of them belonging to *V. grandis*.

The majority of the specimens of this species have the lateral chambers damaged, but the regular shape of the zooecium, and the characteristic slightly inclined vittae with two rows of pores, are sufficient to identify this species. Variation is greatest in number of pores in each row of the vittae, the least number observed being seven, and the greatest number ten. Otherwise, it is a very constant species. I have referred to *V. cordata* (Maplestone) as the ovicell of this species. The proximal zooecium has the distinctive vittae of *V. grandis*, and both forms are found at Clifton Bank.

VITTATICELLA SPECIOSA (Macgillivray, 1895).

1895. *Caloporella speciosa* Macgillivray. *Trans. Roy. Soc. Vic.*, iv., p. 19, pl. ii., fig. 15.

1910. *Vittaticella cruciformis* Maplestone. *Proc. Roy. Soc. Vic.* (n.s.), xxiii. (2), p. 271, pl. xxxviii., fig. 13.

Description.—Zooecium elongate, isosceles triangular in outline, distal end being broader. Length more than twice greatest width, which occurs across summit of zooecium. From summit, margins descend parallel to axis of zooecium until level of summit of vittae is reached, from whence they turn obliquely to blunted base.

Proximal rim three-quarters of distance distally from base of zooecium, and is one-quarter greatest width in length, slightly concave and raised by a transversely elongate semi-elliptical elevation, with a longitudinally elongate elliptical low elevation below, extending proximally down sternal area. Aperture roughly circular, and extending half distance from proximal rim to summit of zooecium, distal rim protruding slightly.

A faint linear groove extends from outer margins of summits of vittae to distal rim. The scapular chambers, in extent about half height of aperture, have their bases approximately on level of distal rim. Suprascapular chambers are stunted, hollow, triangular chambers above avicularia, and of very small extent. Infrascapular chambers extend from base of scapulars to below summits of vittae.

The moderately broad vittae extend from a short distance below level of proximal rim almost to base, and have two rows of pores averaging ten in each row, and set up against margins of vittae.

Vittae obliquely lateral, surfaces making an approximate angle of  $45^{\circ}$  with frontal, and equalling in length three-fifths of length of zooecium.

Dorsal surface moderately convex, with a depressed triangular area at each upper angle commencing three-quarters of distance distally from base of zooecium, representing dorsal view of lateral chambers. In geminate pairs, vittae of daughter zooecium almost as long as those of mother zooecium, while axes of zooecia are inclined at  $35^{\circ}$ . Ovicell as yet unknown.

Dimensions.—Zooecium, length 0.7 mm., width 0.34; Vittae, length 0.42, width 0.08; aperture, diameter 0.1.

Localities.—Balcombe's Bay, Glencoe No. 7 bore, 1,270 feet (Oligocene); Clifton Bank; Flinders; Dartmoor; Glencoe No. 7 bore, 650 feet (Lower Miocene); Mitchell River (Miocene); Knight's bore, Dartmoor.

Observations.—This species might be confounded with a damaged specimen of *V. grandis*, but is readily distinguished by its more slender form, by angle of inclination of vittae to frontal and lesser extent, and more distal position of lateral chambers. The species varies slightly, usually being more slender, and the vittae making a greater angle with the frontal, over  $50^{\circ}$  having been observed. Variation in opposite direction rare. Comparatively rare in the Oligocene, but it is a common and widely-ranging species in the Miocene.

The unusually preserved *V. cruciformis* appears to belong to this species, the matrix having apparently partly re-crystallized, and, in doing so, has joined together a geminate pair and a single zooecium. A rounded portion of the matrix is seen above the mother zooecium of the geminate pair, and at first glance appears to be an ovicell, but closer examination shows ragged edges at the junction, thus showing that it does not belong to the zooecia. The single zooecium does not appear to be in contact with the summit of the mother zooecium as seen after a comparison of the length of the zooecia. It is not uncommon to find specimens marred by calcareous encrustations in slightly re-crystallized polyzoal limestones. This form was recorded from Bairnsdale.

#### VITTATICELLA INSIGNIS (Macgillivray, 1895).

1895. *Caloporella insignis* Macgillivray. *Trans. Roy. Soc. Vic.*, iv., p. 18, pl. ii., fig. 13.

1898. *Caloporella dendrina* Maplestone. *Proc. Roy. Soc. Vic.* (n.s.), xi. (1), p. 17, pl. 1, fig. 8.

Description.—Zooecium roughly kite-shaped, length being slightly more than one and a half times greatest width, which occurs just above distal end of vittae, i.e., at a level two-thirds of distance distally from proximal connecting tube aperture.

Proximal rim slightly more than two-thirds of distance distally from proximal connecting tube aperture, and is one-quarter greatest width of zooecium; slopes obliquely downward from each corner of aperture to form an obtuse angle in centre. Distal and lateral margins in form of an arc greater than a semicircle, and extend more than half distance from proximal rim to distal connecting tube aperture. A longitudinally elongate semi-elliptical area below proximal rim raises it above level of frontal, lateral and distal margins also protruding slightly.

Vittae very narrow, with a single row of five to seven pores, situated on margins of frontal extending from just below level of proximal rim almost to base of zooecium, and tapering to proximal end. They face obliquely laterally, and are wholly on the frontal.

A linear groove extends from summit of vittae to centre of distal rim, and is there replaced by a ridge branching to right and left of distal connecting tube aperture, thus marking off limits of lateral chambers. Lateral chambers in most cases much damaged, but from a series of specimens the following observations have been made:—Scapular chambers extend half height of aperture above and below distal rim, and face directly laterally. Infrascapular chambers extend from base of scapular chambers to summits of vittae. Suprascapular chambers appear to be similar to those of *V. grandis*, extending well above the level of distal connecting tube aperture as a calcified triangular compartment.

Dorsal surface very convex centrally, with a narrow flange broadening into a triangular flange in upper half of zooecium, the whole depressed area flanging zooecium from slightly above proximal end to distal end, representing dorsal view of vittae and lateral chambers. Geminate pair of this comparatively rare species as yet unknown.

Ovate ovicell surmounting zooecium, ventricose with a slight longitudinal depression down centre, on which dendroid markings ramify from the central one in the depression. Ovicell surrounded by a broad punctate ridge.

Dimensions.—Zooecium, length 0.49 mm., width 0.32; Vittae, length 0.25, width 0.03; Aperture, diameter 0.08.

Localities.—Clifton Bank; Flinders; Knight's bore, Dartmoor.

Observations.—Resembles *V. grandis* with regard to lateral chambers and proportion of length to width, but is readily distinguished by the single row of pores in the vittae, and by the dorsal view, which shows the vittae extending as a flange almost to the base of the zooecium. It is related to *V. sacculata* in that they both have a single row of pores, but *V. sacculata* is a much more slender form, and its suprascapular chambers are not calcified.



This species is, as far as observed, very constant in character, and no variation of importance has been noticed in the series examined. It is proposed to regard *V. dendrina* as the ovicell of this species because of the narrow vittae with the single row of pores seen on the rather broad proximal zooecium, and both forms also occur at Muddy Creek.

VITTATICELLA SACCULATA (Busk, 1884).

1884. *Catenicella sacculata* Busk. "Challenger Reports" Zoology, x., pt. v., p. 12, pl. i., fig. 7.  
 1895. *Caloporella sacculata* Macgillivray. Trans. Roy. Soc. Vic., iv., p. 20, pl. ii., fig. 21.  
 1909. *Scuticella sacculata* Levinsen. Morph. Syst. Stud. Cheil. Bryo., p. 233, pl. xii., fig. 2A.

*Description*.—Outline of zooecium elongately isosceles triangular in shape, with blunted base, greatest width occurring at level of avicularia, and equalling slightly less than one-third length of zooecium.

Proximal rim of aperture one-third greatest width in length, slightly concave, and occurring at a level three-quarters of distance distally from proximal connecting tube aperture; elevated above level of frontal by a longitudinally elongate semi-elliptical elevation. Shape of aperture approximately circular, with lateral and distal margins slightly raised above frontal level. Aperture extends slightly more than half distance distally from proximal rim to distal connecting tube aperture.

Vittae, facing obliquely laterally and placed on margins of frontal, extend from slightly below proximal rim to within a short distance of base of zooecium. They are narrow, and contain a single row of six pores, and equal in length more than two-thirds length of zooecium.

Scapular chambers, on level of distal rim of aperture, equal in extent two-thirds height of aperture, and face obliquely upwards and slightly to front. Suprascapular chambers membranous, and of small extent; infrascapular chambers extending as hollow compartments from base of scapular chambers to summits of vittae.

Dorsal surface moderately convex, with a triangular depressed area at each upper angle of zooecium extending less than half way down zooecium. In a geminate pair, vittae of daughter zooecium shorter and contain fewer pores, while adzooecial side has a scapular chamber lodging an avicularium. Axis of daughter zooecium inclined at  $40^\circ$  to that of mother zooecium. Ovicell as yet not known.

Dimensions.—Zooecium, length 0.6 mm., width 0.22; Vittae, length 0.4, width 0.05; aperture, diameter 0.09.

Localities.—Moorooduc No. 6 bore, 4 feet to 6 feet (Oligocene); Clifton Bank; Dartmoor; Campbell's Point; living off Barra Grande, Brazil, at 32 to 400 fathoms.

Observations.—This interesting species is found living in the South Atlantic, but is not living in Australian waters, although it is fairly common in our Tertiary series. The most careful comparison of the fossil forms has been made with Busk's description and figure(2), and they have been found to agree in every particular, except that the three pores in the elevation below the proximal rim are wanting in all but one exceptionally well-preserved specimen. The finding of this specimen leaves no doubt as to the fossil and recent forms being conspecific.

On account of the three pores mentioned above, Levinsen(4) has referred this species to the genus *Scuticella*, but since the true fenestrate area of *Scuticella* is not fully developed, and the vittae have not been modified into the lower infrascapular compartment of *Scuticella*, it seems advisable to refer it to *Vittaticella*, although, without a doubt, it is an important connecting link between the two genera.

This species might be confounded with *V. insignis*, but is distinguished by its more slender shape and the uncalcified supra-scapular chambers. *V. speciosa* is similar to this species with regard to the lateral chambers, but its double row of pores in the vittae serves to distinguish it.

VITTATICELLA PRAETENUIS (Macgillivray, 1895).

1895. *Caloporella praetenuis* Macgillivray. *Trans. Roy. Soc. Vic.*, iv., p. 20, pl. ii., fig. 20.

Description.—Zooecium roughly rectangular in outline, very elongated, length being three times greatest width, which occurs at level of scapular chambers, i.e., five-sixths of distance distally from proximal connecting tube aperture.

Proximal rim of aperture situated three-quarters distance distally from proximal connecting tube aperture, and is half greatest width of zooecium in length; slightly concave, and raised above level of frontal by a transversely elongate semi-elliptical elevation. Aperture roughly circular in shape, extending over more than half distance from proximal rim to summit of zooecium.

Vitae very narrow and shallow, extending from just below level of proximal rim almost to base of zooecium. They face directly forward, and appear to have a single row of pores.

Scapular chambers, very small in extent, situated at about level of distal rim of aperture, and face directly laterally. Supra-scapular chambers extend from summits of scapular chambers, as narrow depressions, to summit of zooecium. Infrascapular chambers open directly laterally, and extend from base of scapular chambers for a distance equal to two-thirds height of aperture proximally from scapular chambers.

Dorsal surface regularly moderately convex, with a small triangular depression behind scapular chambers. Daughter zooecium of geminate pair occasionally equals the mother zooecium in length. Axis of daughter zooecium inclined at  $50^{\circ}$  to that of mother zooecium. Ovicell not yet known.

Dimensions.—Zooecium, length 0.5 mm., width 0.18; Vittae, length 0.3, width 0.02; aperture, diameter 0.08.

Localities.—Clifton Bank; Campbell's Point.

Observations.—This species, which is allied to *V. venusta*, is a very rare form, only one specimen, the type, having been seen by Macgillivray. Its unusually elongated outline, and the narrow frontal vittae, are distinctive.

VITTATICELLA ROSTRATA (Maplestone, 1898).

1898. *Caloporella rostrata* Maplestone. *Proc. Roy. Soc. Vic.* (n.s.), xi. (1), p. 18, pl. ii., fig. 12.

Description.—Zooecium hastate, upper angles being produced upwards and tapering to a point, greatest width being between summits of upper angles, and equalling a little less than half length of zooecium.

Proximal rim of aperture situated centrally one-quarter of distance proximally from distal connecting tube aperture, and is one-quarter width of zooecium at that level. No elevation below proximal rim. Two short denticles visible a short distance up lateral margins from the slightly concave proximal rim. Lateral and distal margins approximately semicircular, and not elevated. Aperture extends more than half distance distally from proximal rim to distal connecting tube aperture.

From summits of vittae a faint groove extends to distal margin of aperture, demarcating base of scapular chambers, which extend obliquely upward as hollow triangular chambers, with the elongated triangular avicularian aperture facing laterally and slightly downwards.

Vittae, very narrow and deep, with a single row of pores, are entirely lateral and face directly laterally. They extend from base of avicularia to base of zooecium.

Dorsal side very convex, but has a submarginal groove. Geminate pair or ovicell not yet observed.

Dimensions.—Zooecium, length 0.6 mm., width 0.3; Vittae, length 0.37, width 0.03; aperture, diameter 0.08.

Locality.—Clifton Bank.

Observations.—A very distinctive but rare species, one specimen only being known. Vittae and avicularia are both distinctive, as is also the apparent absence of suprascapular and infrascapular chambers. It is allied to the recent *V. cornuta*, from which it is distinguished by the very convex dorsal bulge and the distinctive avicularium.

## VITTATICELLA TERES (Macgillivray, 1895).

1895. *Caloporella teres* Macgillivray. *Trans. Roy. Soc. Vic.*, iv., p. 19, pl. ii., figs. 18, 19.

1898. *Caloporella maculata* Maplestone. *Proc. Roy. Soc. Vic. (n.s.)*, xi. (1), p. 17, pl. i., fig. 10.

Description.—Zooccium sub-rectangular, and tapering at slightly more than three-quarters of distance proximally from summit of zooccium to proximal connecting tube aperture. Length approximately twice greatest width of zooccium, which occurs across upper angles of scapular chambers.

Proximal rim of aperture situated approximately five-sevenths of distance distally from proximal connecting tube aperture, and equals in length about one-third width of zooccium. From lower corners of aperture sides of proximal rim slope obliquely downward to form a very obtuse angle where they meet in the centre. Height of aperture about half distance from proximal rim to summit of zooccium. Distal rim semicircular, and slightly thickened. In each corner of aperture, just above proximal rim, is a small, moderately developed denticle. Whole of apertural rim elevated above level of frontal.

Scapular chambers extend from below proximal rim to summit of zooccium, and are bounded by a faint ridge extending obliquely across upper angles of zooccium. Avicularium occupies tip of this triangular protrusion, and faces directly laterally, being approximately on level of distal rim of aperture. Suprascapular compartments represented by linear depressions extending to left and right along summit of zooccium, from distal connecting tube aperture.

The very narrow vittae face directly laterally, extending from base of scapular chamber almost to base of zooccium, and probably have a single row of pores.

Dorsal surface very convex in central region, but depressed in region below distal connecting tube aperture, and also behind scapular chambers. A narrow flange formed by vittae borders margin of zooccium. In geminate pair axis of daughter zooccium inclined at  $60^\circ$  to that of mother zooccium.

Ovicell globular, inflated, punctate, extending from level of proximal rim of aperture of proximal zooccium to within a short distance of proximal rim of distal zooccium. A vertical narrow elliptical pore occurs in centre of ovicell just above distal rim of proximal aperture.

Dimensions.—Zooccium, length 0.58 mm., width 0.3; Vittae, length 0.38, width 0.04; aperture, diameter 0.9.

Localities.—Balcombe's Bay (Balcombian, Oligocene); Clifton Bank, Campbell's Point; Griffin's; Moorabool.

Observations.—The only species with which this is liable to be confused is *V. hannaefordi*, which, however, is a much broader form, has larger lateral chambers, and lacks the marginal flange

seen on the dorsal side of *V. teres*. A comparison of the avicularia in the distal zooecium and the shape of the proximal zooecium will indicate the affinity of the ovicell described as *Caloporella maculata* with the present form. The ovicell was recorded from Moorabool.

VITTATICELLA HANNAFORDI (Macgillivray, 1868).

1868. *Catenicella hannaforði* Macgillivray. *Trans. Roy. Soc. Vic.*, ix., p. 127.

1885. *Catenicella hannaforði* Macgillivray. *Prodromus Zoology Victoria*, decade 3, pl. 24, fig. 13, p. 24.

1895. *Caloporella hannaforði* Macgillivray. *Trans. Roy. Soc. Vic.*, iv., p. 19, pl. ii., figs. 16, 17.

Description.—Zooecium broadly ovate, with upper angles protruding slightly. Length about one and a half times greatest width, which occurs at summits of scapular chambers.

Proximal rim at a level two-thirds of distance distally from proximal connecting tube aperture; slightly concave, and raised above level of frontal by a semicircular elevation; in length less than one-third greatest width. Lateral and distal margins, elevated above level of frontal, make outline of aperture semicircular. In each angle of proximal rim is a well-developed denticle.

Vittae facing almost directly laterally equal in length half that of zooecium; deep, and appear to contain a single row of pores.

Scapular chambers extend from about level of proximal rim almost to level of distal connecting tube aperture as a triangular outward expansion of zooecium; suprascapular chambers extend as slits from summits of scapular chambers to distal connecting tube aperture. On each side of aperture is an elongated oblique slit, which may possibly represent infrascapular chambers of this species.

Dorsal surface very convex, with a triangular flange on each side in upper half of zooecium, representing dorsal view of the large avicularia. In a geminate pair axis of daughter zooecium is inclined at 40° to that of mother zooecium.

Dimensions.—Zooecium, length 0.55 mm., width 0.33; Vittae, length 0.27, width 0.03; aperture, diameter 0.1.

Localities.—Clifton Bank; Campbell's Point; Griffin's; Victorian coast (recent).

Observations.—This species is allied to the preceding one, *V. teres*, and appears to be a derivative of that species. It is readily distinguished from *V. teres* by its much broader zooecium, and by the presence of the oblique slits on either side of the aperture.

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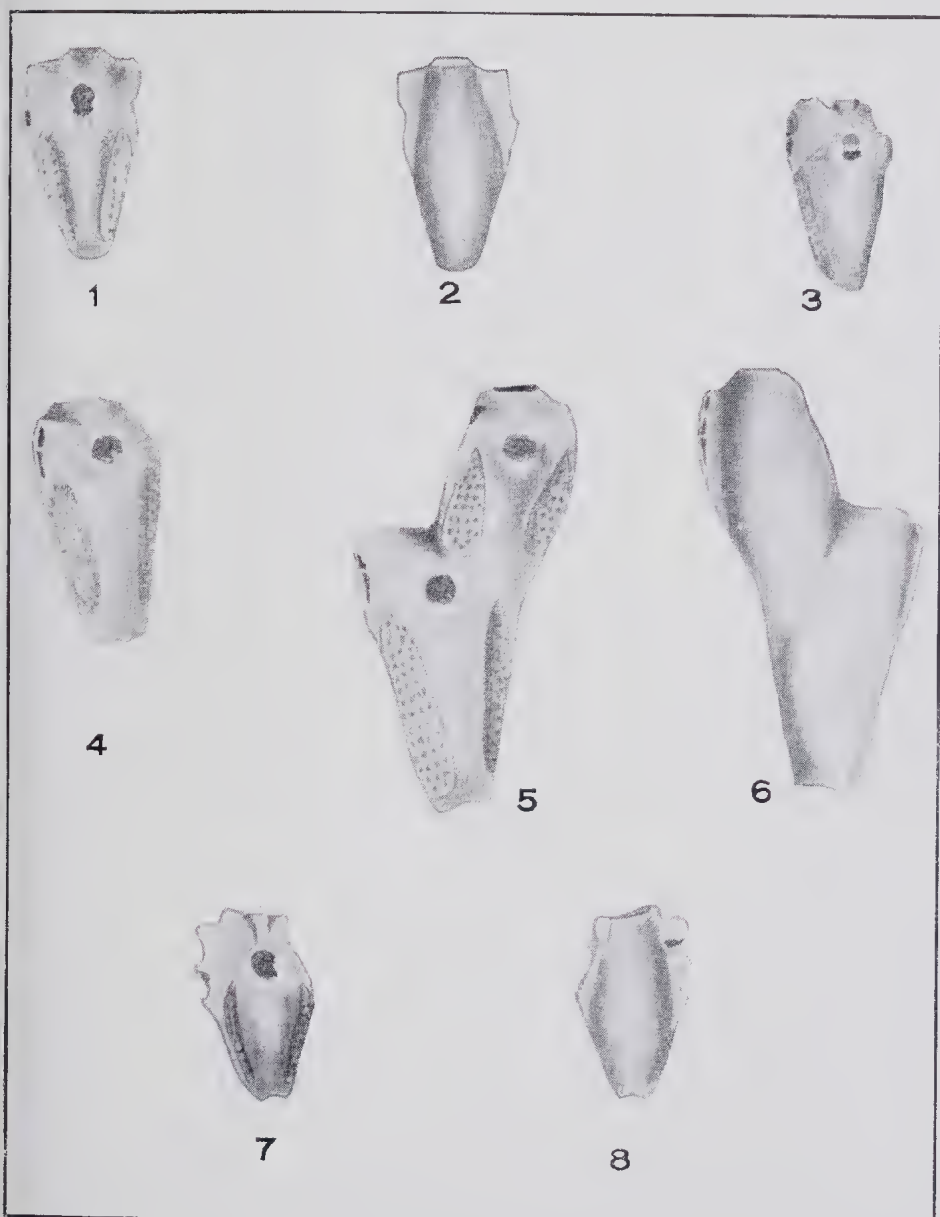
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### Explanation of Plate VIII.

(All figures drawn with camera lucida.)

- Fig. 1.—*Vittaticella speciosa* (Macgillivray). From polyzoal limestone under railway bridge over Glenelg River at Dartmoor. Frontal view. Plesiotype. Nat. Mus. Coll., Regd. No. 13730. Coll. L. W. Stach.
- Fig. 2.—*V. speciosa*. Dorsal view of same specimen.
- Fig. 3.—*V. speciosa*. Glencoe No. 7 bore, 580 feet from the surface. Frontal view. Plesiotype. Nat. Mus. Coll., Regd. No. 13731. Coll. Geol. Sur., Vic.
- Fig. 4.—*V. cnormis* (Maplestone). Glencoe No. 7 bore, 650 feet from surface. Frontal view. Plesiotype. Nat. Mus. Coll., Regd. No. 13732. Coll. Geol. Sur., Vic.
- Fig. 5.—*V. cnormis*. Same bore and depth. Frontal view of geminate pair. Plesiotype. Nat. Mus. Coll., Regd. No. 13733. Coll. Geol. Sur., Vic.
- Fig. 6.—*V. cnormis*. Same specimen. Dorsal view.
- Fig. 7.—*V. grandis* (Maplestone). Clifton Bank. Frontal view. Plesiotype. Nat. Mus. Coll., Regd. No. 13734. Coll. L. W. Stach.
- Fig. 8.—*V. grandis*. Dorsal view of same specimen.

Magnification in every case is 45.



*Vittaticella* spp.